

# Rare case of a strangulated intercostal flank hernia following open nephrectomy: A case report and review of literature

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## ABSTRACT

**INTRODUCTION:** Flank incisions may be associated with incisional flank hernias, which may progress to incarceration and strangulation. Compromised integrity of the abdominal and intercostal musculature due to previous surgery may be associated with herniation of abdominal contents into the intercostal space. There have been six previously reported cases of herniation into the intercostal space after a flank incision for a surgical procedure. This case highlights the clinical picture associated with an emergent strangulated hernia and highlights the critical steps in its management.

**PRESENTATION OF CASE:** We present a case of a 79-year-old adult man with multiple comorbidities presenting with a strangulated flank hernia secondary to an intercostal incision for a right-sided open nephrectomy. The strangulated hernia required emergent intervention including right-sided hemicolectomy with ileostomy and mucous fistula.

**DISCUSSION:** Abdominal incisional hernias are rare and therefore easily overlooked, but may result in significant morbidity or even death in the patient. The diagnosis can be made with a thorough clinical examination and ultrasound or computed topographical investigation. Once a hernia has become incarcerated, emergent surgical management is necessary to avoid strangulation and small bowel obstruction. **CONCLUSION:** Urgent diagnosis and treatment of this extremely rare hernia is paramount especially in the setting of strangulation.

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## 1. Introduction

Flank hernias are protrusions of abdominal visceral contents through weakened areas in the lateral abdominal wall. They are most commonly caused by trauma but can also be caused by previous surgery, after which the hernia would be considered incisional. Flank hernias occur in 0.2% of blunt trauma patients [1] but are also seen after abdominal and thoracic operations [2]. As a part of this group, lateral intercostal herniation following a surgical procedure has been reported in only six cases in world literature. We present a rare case of an incisional flank hernia into the 11th and 12th intercostal space with strangulation of the large bowel. This case illustrates the clinical picture of a patient with emergent strangulated hernia and highlights the critical steps in the management of this catastrophe.

## 2. Presentation of case

A 79-year-old African American man was brought to the emergency department after being found unresponsive with labored breathing. He had a past medical history of mechanical mitral valve replacement at age 61, hypertension, congestive heart failure, prior upper gastrointestinal bleed while on Warfarin, stroke at age 74, and an open right nephrectomy at age 63 for renal cell carcinoma. On admission, the patient was noted to be hypotensive with altered mental status and a Glasgow Coma Scale of 12 (Eye: 4, Voice: 3, Motor: 5). An abdominal examination revealed moderate distention but no tenderness or signs of peritonitis. Blood and serological examinations showed metabolic acidosis with pH 7.21, lactate 6.8 mmol/L, base deficit 14.4, leukocytosis (white blood cell count  $43.9 \times 10^9$  K/mcL), supra-therapeutic International Normalized Ratio (INR) 8.9, elevated aspartate aminotransferase (AST) 3517, and elevated alanine aminotransferase (ALT) 1503. Blood cultures taken on admission were positive for *Escherichia coli*. Computed tomography (CT) scan of the abdomen and pelvis without contrast showed herniation of the right colon through the right 11th and 12th ribs (Fig. 1). The diagnosis of bowel obstruction versus strangulated bowel was suspected secondary to the clinical picture of abdominal distention, and serology showing metabolic acidosis, leukocytosis, and lactic acidosis. CT scan showing

Abbreviations: CT, computed tomography; SICU, surgical intensive care unit; INR, international normalized ratio; AST, aspartate aminotransferase; ALT, alanine aminotransferase.

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**Table 1**  
Patient information.

Author	Year	Age	Sex	Left versus right sided	Indication for surgery	Intercostal space	Herniation contents	Post-operative length
Best [9]	2001	57	Female	Left	Abdominal aortic aneurysm repair	10th–11th	Left colon	6 months
Centorrino et al. [10]	1998	42	Male	Right	Marsupialization of liver hydatid cyst	9th–10th	Right colon	12 months
Ohlow et al. [11]	2011	61	Female	Right	Angiomyolipoma	11th–12th rib	Liver	5 years
Rompen et al. [7]	2005	73	Male	Right	Renal cell carcinoma	10th–11th ribs	Small bowel	6 years
Rosch et al. [8]	2006	57	Female	Left	Renal cell carcinoma	11th–12th ribs	Left colon	15 months
Yamamoto et al. [2]	2013	75	Female	Right	Renal cell carcinoma	10th–11th ribs	Transverse colon	4 years

herniation of bowel contents confirmed the diagnosis of strangulated bowel. The patient was admitted to the surgical intensive care unit (SICU) for resuscitation and correction of his supra-therapeutic INR prior to surgical intervention. Upon exploration of the abdomen, the hepatic flexure of the colon was prolapsed through a 2.5 cm defect in his right flank. A right hemi-colectomy followed by ileostomy with mucous fistula was performed to remove the necrotic bowel segment. The posterior fascia was then closed over the hernia defect with interrupted polydioxanone (PDS) suture. This patient had a complicated postoperative course secondary to multi-organ system failure and sepsis leading to progressive deterioration and death.

### 3. Methods

A comprehensive search of the Pubmed database was done using the search terms “intercostal hernia”, “incisional hernia”, and “flank hernia”. Duplicates and non-human studies were screened using MeSH terms. The subsequent articles were assessed for inclusion into our study resulting in 6 articles. This paper is in line with the CARE Criteria [3].

### 4. Discussion

Abdominal wall hernias have a prevalence of 1.7% for all ages and 4% for those older than 45 years of age [4]. An estimated 10–15% of laparotomy incisions will eventually develop into hernias [4]. Incisional hernias result from non-healing or late disruption of the fascial layers of the wound after previous surgical incision into the abdominal wall [5].

Protrusion of abdominal or chest contents through the area of weakened abdominal wall into the intercostal space is a rare possibility. Incisional intercostal flank hernias are most commonly caused by trauma, but have also been reported as spontaneous [6]. There are only six previously described cases of incisional intercostal flank herniation after a surgical procedure. The average age

of the patients involved is 60.8 (range 42–79). Contents of the hernia sac in previous reports include small bowel [7], large bowel [2,8–10], and liver [11], while our patient had herniation of the right colon. The herniation was most commonly right sided and was left sided in two cases [8,9]. The indication for surgery was most commonly renal cell carcinoma, but other indications were angiomyolipoma [11], marsupialization of liver hydatid cyst [10], and abdominal aortic aneurysm repair [9]. The location of herniation was most commonly 10th or 11th intercostal space but the 9th intercostal space was the location in one case [9]. The hernia repair operation occurred 6 months to 6 years after the original operation. Details of each case are shown in Table 1.

Causes of intercostal herniation include penetration of the intercostal muscle, dislocation of the costo-transverse joint, paralysis of the thoracic muscle caused by intercostal nerve injury, injury to the costal cartilage, and excessive abdominal pressure which can be associated with obesity, ascites, and bowel obstruction [2,12]. The diagnosis can be made upon physical examination and ultrasonography [8]. When these results are inconclusive, a definitive diagnosis of flank herniation can be made using CT [1,8]. Operative correction is indicated in patients with symptomatic herniation, incarcerated/strangulated herniation, or asymptomatic herniation that directly affects the patient's quality of life [13]. Once a hernia has become incarcerated, emergent surgical management is necessary to avoid strangulation and small bowel obstruction. The average rate of emergent repair for incisional hernias is 11 per 100,000. This rate increases to 23.4 per 100,000 for all hernias with an associated mortality rate of 7% for patients over 60 years of age [13]. The surgeon must pay close attention to the repair of intercostal incisional hernias due to an exceptionally high recurrence rate of 28.6% [12].

### 5. Conclusion

Intercostal flank hernias following nephrectomy are extremely rare. Urgent diagnosis and management in the setting of strangulation is paramount given the associated increase in morbidity and mortality.

### Conflict of interest

All authors declare no conflicts of interest.

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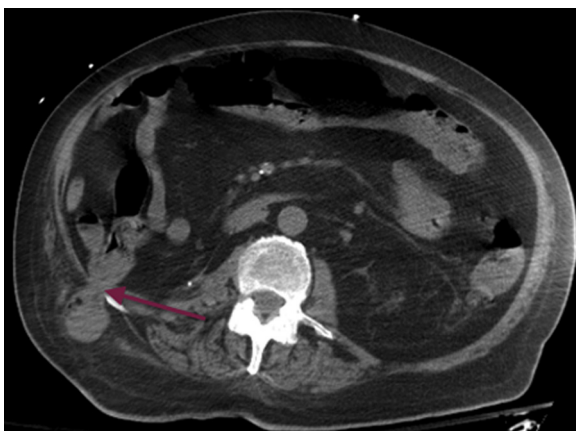
None.

### Ethical approval

None.

### Consent

This patient had a complicated postoperative course secondary to multi-organ system failure and sepsis leading to progressive



**Fig. 1.** Computed tomography scan of right colon hernia through the 11th and 12th rib.

deterioration and the patient's untimely death. After an extensive two month long search for relatives of the deceased, we were unable to find any relatives. No images of the patient were included in the report.

#### Authors' contributions

Oluwaseun Akinduro: Writing the paper, final review and editing. Frank Jones: Final review and editing. Jacquelyn Turner: Final review and editing. Frederick Cason: Final review and editing. Clarence Clark: Study concept, writing the paper, final review and editing.

#### Guarantor

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